

Statement with copies of references attached was acknowledged by Postal Card Receipt as being received on May 13, 2002. The Supplemental Information Disclosure Statement includes references not already of record in the initial Information Disclosure Statement which were cited in a corresponding PCT Application examined by the International Searching Authority at the European Patent Office. A copy of the International Search Report is enclosed. It will be noted that this Search Report indicates all references as being merely of general interest (classification A). This Search Report evidences that the International Examiner did not consider references identical and similar to those cited by the Examiner in this U.S. Application as being applicable to the claims. Applicant respectfully submits for the reasons pointed out below, that these references are not pertinent to the claims. It is respectfully requested that the Information Disclosure Statements be properly annotated and made of record in this U.S. Application. If the Information Disclosure Statements are not in the file wrapper at the U.S. Patent and Trademark Office, Applicants will be glad to immediately fax copies of these Statements to the Examiner upon request.

The Examiner notes that translations of foreign references cited will be forthcoming. It is respectfully submitted that the translations be provided as soon as possible so that Applicants will have the opportunity to submit written comments before the next Office Action, if they consider such comments may be necessary or desirable.

As regards the Examiner's suggestion as to the arrangement of the specification. It is respectfully submitted that the guidelines are not mandatory. The rules require that the specification contain the elements, but do not require them to be presented in certain order or under subheadings. It is respectfully submitted that all of the elements required have been contained in the "DESCRIPTION" and in the "ABSTRACT" and the specification complies with the rules.

As regards the objection to the specification, appropriate corrections have been directed as the Examiner requires. Consider the reference numerals referred to as follows: 10 is the pile or flat pile which is a stack of strands which are flat because of the tension set in during formation. See, for example, column 5, lines 2-3. 16 is the outside of the pile. 18 is the locking fin. 20 is the entire flat pile weatherstrip. Note, weatherstrip and weatherstripping are synonymous terms. See column 4 lines 20-23 for

example. 22 is the barrier fin or glide fin. 24 is the frame or member which may be an extrusion. See page 5, lines 4-6. 48 is the extrusion member in which the flat pile is installed as shown in Fig. 5. 26 is the T-slot. 42 is a type of slot in the member in which the pile weatherstrip is installed. A kerf is a slot which has edge interval(s), such as the serrations shown in Fig. 3 and is defined on page 3, lines 10 and 11. 74 is a pile contouring fin (see Fig. 8A). 76 is the contouring fin shown in Figs. 9A and B. 78 is the right side arm of contouring fin 76 as shown in Figs. 9A and B. 80 is the left side arm of contouring fin 76. It is believed that the specification is clear and sufficient to teach the invention to one skilled in the art. The withdrawal of the objection to the specification is respectfully solicited.

As regards the rejection of the claims under 35 U.S.C. 112 (2). Amendments of a clarifying nature have been made in certain claims with regard to the Examiner's remarks. In regards to Claim 1, there is antecedent to the bent flat pile in the language "said flat pile being disposed in said slot bent upwardly along an axis..." In regards to paragraph 5 of the Action, the Examiner is correct. A preamble should be considered if it affects the enumerated elements of the claims. This principle has long been established in patent jurisprudence. See *Stradar et al. v. Watson* (113 USPQ 365-368 (CADC, 1957) and *Bell Comm. Res. Inc. v. Vitalink Comm. Corp.*, 34 USPQ2d 1816 (CAFC, 1995). Amendments in Claims 3 and 19 are believed to obviate the Examiner's concerns. Accordingly, the 35 USC 112(2) rejection should be withdrawn. The rejections under 35 U.S.C. 103 are respectfully traversed. First consider Applicants' invention as expressed in the claims. The invention provides an improved type of pile weatherstripping not heretofore shown or described, or even conceived of, in the art of weatherstripping. The invention enables the weatherstrip to be a flat pile which is as stated in Claim 1 made up of a plurality of strands in side-by-side relationship, which strands have the resiliency to stay straightened defining a flat pile of strands which extend longitudinally. The piles are bent only when inserted into the slot and they are held there due to their tensioning and resiliency, which forms them into two parts or sides which tend to spring outwardly. Because of this tension or spring action, the strands are kept in the slot and are positioned to provide a sealing action against another member such as a sash of a window or the frame of a door which closes against the weatherstripping.

Heretofore, weatherstripping was made to extend from a backing strip such as the strip 32 in the '390 patent or 13 in the '487 patent. It is this backing strip which is forced into the slot and holds the pile upright. See '487 patent, Fig. 4 or any of the other references of record on pile weatherstripping. The invention also contemplates use of a locking fin 18 which lies flat with the pile until it is installed. See for example, Fig. 7A for the flat configuration prior to installation and the locking action as is shown in Fig. 7C. Another feature is the use of an interior fin such as the contouring fin 74 and 76 to establish the contour of the sides of the pile and provide the desired type of sealing action, either bending of the pile or crushing of the pile. The bead 12 also may be used to establish bending or crushing action as desired. With prior pile weatherstripping, crushing action is provided which is not entirely suitable for certain sealing applications.

The Examiner will appreciate that the invention relates to pile weatherstripping, not to seals made out of rubber or foam which are entirely different in kind and operation than pile weatherstripping. Such rubber or foam seals are the subject of the foreign patents which the Examiner mentions in the rejection. Accordingly, the references relied upon by the Examiner are not analogous to the flat pile weatherstripping which is claimed.

It is respectfully submitted that there is nothing in the '390 or '487 patent to indicate that the pile is tensioned to spring outwardly. Weatherstripping of the '390 patent is made in accordance with the Horton patent cited in column 1, line 24, which is of record in the Information Disclosure Statement filed by Applicants. The weatherstripping is made by wrapping pile around the mandrel and then ultrasonically welding the backing strip to the pile at the edges of the mandrel. There is nothing whatsoever which provides a pile which tends to stay flat.

The '487 patent is for a rug type pile which necessitates that each strand be attached to the backing, usually by glue. The strands do not have any tension which makes them spread apart, and since they are assembled to the backing strip, they cannot be a flat pile. The only configuration of the '487 patent pile as the '390 patent pile, is an upright pile.

There is no locking fin in the '390 or '487 patents. Element 30 in the '390 patent and element 14 in the '487 patent are outside barrier fins. They control air and water infiltration and do not lock a flat pile into a slot.

In the '390 and '487 patents as in the Dieterich '038 patent, the backing strip, not the pile, does the locking. Nothing in these patents remotely suggests that the pile could provide locking action or that a normally flat fin on a flat pile can facilitate locking.

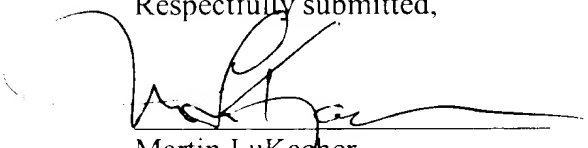
It is respectfully submitted that there is nothing in the references to support the conclusions of the Examiner in paragraphs 12 and 15 of the Action.

With all due respect, it is submitted the Examiner's interpretation of what is shown in the conventional types of upright pile weatherstripping of the '390 and '487 patents is not supported by these patents. As pointed out in the introductory portion of Applicants' specification and as argued above, patents like '390 and '487 do not remotely suggest the invention. Accordingly, the withdrawal of 35 U.S.C. 103 rejection is believed to be in order and is respectfully urged.

Favorable action upon further consideration of this application and the allowance thereof is respectfully solicited.

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Enc. PCT/EPO Search Report



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PILE WEATHERSTRIPPING

DESCRIPTION

5 The present invention relates to pile weatherstripping and more particularly to a pile weatherstrip which is formed by bending and insertion of a strip of side-by-side strands of flat pile into a kerf or other slot in a member for providing sealing action along a surface of the member through which the pile extends.

10 It is a feature of the present invention to provide pile weatherstripping which is formed from flat pile. Another feature of the invention is to provide pile weatherstripping which is operable in compression or in a bending mode. In the bending mode, the pile can bend over a range covering different size clearances between members to be sealed. A single size of flat pile can form weatherstripping which covers a large range which may be approximately 100 mils (0.100 inch) of clearance, or more. Still another feature of the invention is to provide
15 weatherstripping which may be manufacturable at lower cost than weatherstripping which has been heretofore available, such as of the type shown in Johnson, U.S. Patent No. 5,807,451, [5,806,451] issued September 15, 1998, or Miska, U.S. Patent No. 4,288,483, issued September 8, 1981.

20 Pile weatherstripping has conventionally been provided by piles which project upwardly into a brush, rather than are formed into a brush providing the pile seal upon insertion in the pile receiving slot. Even when strands are wound around a loop and cut into sections, the winding provides bush-like structure with bases or cores to facilitate holding the pile in the slot. See for example, the above cited patents and Metzler, U.S. Patent Re. No. 30,359, issued August 5, 1980.

25 The range of flexure of conventional pile weatherstripping may be limited when the sealing action is accompanied by the crushing of the pile. Such crushing mode operation can exert forces sufficient to bind the movable sealed unit, such as a sash of a window or door frame, which prevents opening of the window or door without more than desirable force. In other words, the stiff strands apply pressure on the sash and cause binding on the sides of the sash.

30 The present invention provides a sash which can operate in a bending mode; providing sealing

without significant crushing of the pile and enabling the pile to bend over a range, commensurate with the height of the pile, over the surface of the member through which the pile extends. The stiffness and height of the pile are therefore controllable. Moreover when barrier fins are used, the bending action also bends the fin rather than causes crenellation which detracts from the sealing action.

Pile weatherstrip provided by the invention may utilize a locking fin on the outside of the flat pile. The inside of the pile is defined by the parts, around the bend, formed when the flat pile is inserted in the slot, which parts face each other. With a locking fin, the force to insert the weatherstripping, preferably by rolling into the slot, is much less than the force to remove the weatherstripping.

In order to control compressive forces exerted by the pile in the crushing mode, the density of the pile (strands per given area) has been reduced, sacrificing the sealing action of the pile. Pile weatherstripping in accordance with the invention can be operated in the crushing mode if desired and without sacrificing the sealing action thereof.

Another advantage of the flat pile weatherstripping provided by the invention is that it is adapted to be assembled by welding, for example, with a bead (a filament) which extends along the inside of the pile. The use of a locking fin facilitates distribution of ultrasonic welding energy and avoids burning of the strands. Locking fins thus afford a further advantage when used in weatherstripping provided by the invention. The lateral spacing of the bent parts (tufts) of the weatherstrip is a function of the diameter of the bead and the width of the T-slot. The compressibility of the pile, even in the crushing mode, may be selectable in accordance with the diameter of the bead and without sacrificing the density and sealing effectivity of the pile. Selectability of bead diameter is still another feature of the invention.

Weatherstripping provided by the invention may readily be made by winding processes which maintain the strands under tension so as to pre-stress or bias the strands to return to straight condition, thus providing a pile which tends to lie flat. Winding processes for making flat pile are similar to those used in weaving and may be of the type described in U.S. [Patents] Patent Nos. 4,022,642, issued May 1977 to Abel, and 1,895,293, issued January 1933 to Morton.

Another advantage of the invention is to provide weatherstripping which is easy to store and may be wound flat around a reel for shipping or storage. Furthermore, the winding can be at higher density and without capturing significant air, and thus the amount of linear footage that can be stored on a standard reel is substantially increased over conventional weatherstripping.

5 Still another advantage of the invention is that the pile may be formed into a slot which may be other than perpendicular to a flat surface of the member to be sealed. The slot may be disposed at an angle less than 90 degrees and even in to a corner of the member.

Briefly described, a pile weatherstrip in accordance with the invention forms a flexible seal projecting from the member to be sealed when received in a holding slot in the member.

10 The slot may, as conventional, extend longitudinally of the member. The slot has a throat which defines steps along opposite edges of the throat internally of the slot. The slot may be a kerf where the throat is provided by teeth which define the edges. A plurality of strands are stacked in side-by-side relationship to provide a flat pile. The strands have resiliency tending to maintain them straight, that is, perpendicular to a longitudinal axis, about which the flat pile defined by the
15 strands is bent. Upon insertion into the slot, the strands are bent inwardly, along the axis which divides the pile into separate parts. These parts are tensioned, because of the tension in the strands, to spring outwardly. Preferably, a locking fin on the outside of the flat pile, is located internally of the slot, and engages the edges at the throat as the locking, fin spring outwardly, so as to retain the weatherstripping in the slot. End portions of the parts of the strands extend
20 outwardly from the slot and define the flexible pile seal.

The foregoing and other features, objects, and advantages of the invention will become apparent from a reading of the following description in connection with the accompanying drawings in which:

Fig. 1 is a perspective view of a flat pile in accordance with the invention;

25 Fig. 2 is a cross sectional view showing the pile weatherstripping formed from the flat pile disposed in a slot;

Fig. 3 is a view similar to Fig. 2 showing the pile disposed in a kerf;

Fig. 4 is a view similar to Fig. 2 showing another installation of pile weatherstripping in

accordance with the invention;

Fig. 5 is a view similar to Fig. 1 showing still another installation of weatherstripping in accordance with the invention, wherein the slot is disposed at a non-perpendicular angle to the surface of the member to be sealed;

5 Fig. 6 is a view similar to Fig. 1 showing the slot and weatherstripping installed in a corner of the member to be sealed;

Figs. 7A, 7B, and 7C are schematic diagrams illustrating rolling of the flat pile weatherstripping to install same in the slot or kerf in the member to be sealed;

10 Figs. 8A and 8B show a flat pile and the weatherstripping formed therefrom, respectively, in accordance with another embodiment of the invention;

Figs 9A and 9B show still another flat pile and the weatherstripping formed therefrom, respectively, in accordance with still another embodiment of the invention.

Referring to Fig. 1, there is shown a stack of strands which form a flat pile 10. The strands are tensioned outwardly so that the strands tend to lie flat in the pile 10. The pile may be
15 made of a polyolefin yarn, preferably polypropylene, which is ultrasonically weldable. A monofilament thread or bead 12 extends along the center of the pile on the inside 14 thereof. This monofilament may be a polyolefin material or any other ultrasonically meltable and weldable material such as nylon. Opposed to the bead 12, on the outside 16 of the pile 10, is a locking fin [16] 18 also of ultrasonically weldable material. This fin may be thicker than the
20 strands forming the pile, while the resilience is of the fin [16] 18 greater (more rigid) than the pile. The requisite resiliency may be obtained by selecting the thickness of the fin 18. The fin is centered along the center of the pile 10 (a longitudinal axis along the center of the width of the pile). An ultrasonic horn is preferably used to compress the bead 12 against the fin 18 thereby compressing the pile along the center axis thereof, and melting the bead, [fin] pile and [locks in]
25 locking fin 18, thereby welding them together and assembling them into the flat pile weatherstrip 20. If desired, a barrier fin 22 of a width which may be equal to the width of the pile as shown or greater than the width of the pile or even somewhat less than the width of the pile, so as to enhance the sealing action of the pile. This fin 22 may be referred to as a glide fin.

Another similarly sized glide fin (not shown) may be provided on the outside 16 of the pile 10 between the pile and the lock fin 18. All these fins are of ultrasonically weldable material and are assembled into the flat pile weatherstripping by adhering the bead 12, pile 10, lock fin 18 and the glide fins to each other, preferably by ultrasonic welding.

5 The pile tends to be a flat pile because of the tension in the strands of the pile which is permanently set when the strands are wound or woven during formation of the pile.

Fig. 2 illustrates a frame or member 24, such as a sash or window frame, having a T-slot 26. The member 24 may, for example, be an extrusion of plastic material, usually vinyl, which forms the sash or frame of a window in which the pile 20 is installed. The T-slot 26 has a throat or neck 28 of a width greater than the diameter of the bead 12. Under the neck 28 are steps 30. 10 The flat pile is bent about the bead 12 into parts (sides) 32 and 34 which flare away from each other. The angular extent of the flare, or the angle between the parts 32 and 34, is determined by the width ["x"] of the slot 26, and the diameter of the bead 12.

The lock fin 18 enters the slot 26 and engages the steps 30 under the neck 28 of the slot. 15 The engagement is along the edges of the lock fin 18. Accordingly, when the weatherstrip[ping] is bent and inserted into the slot 26, it is installed in a way to impede removal. In order to remove the weatherstrip 12, a hook blade may be inserted into the slot 26, past the neck 28 to engage and depress the lock fin along one side thereof so as to allow the weatherstrip 20 to be pulled from the slot. Otherwise, the lock fin 18 permanently locks the weatherstrip in the slot 26.

20 The weatherstrip 20, as shown in Fig. 2, is designed to operate in a bending mode. When in that mode, weatherstrip is capable of forming a seal over an operating range as for example, indicated by the dash lines 38. The weatherstrip 20 is therefore able to accommodate a large range of clearance between the member 24 and another member which is movable toward and away from the extrusion member 24. This operating range may, for example, be 100 mils. or 25 more. Thus a single weatherstrip size may be used to accommodate a large range of closing clearances as between a window sash and frame.

The weatherstrip 20 may, as shown in Fig. 4, be operable in compression or crushing mode, where the parts or sides 32 and 34 extend generally perpendicular to the surface of the

extrusion member [26] 24. Such a more perpendicular relationship than shown in Fig. 2 is obtained by reducing the distance between the bead 12 and the side walls of the throat; that is the spacing between the bead and the side walls of the throat. This may be accomplished with a smaller width T-slot 26. As the width of the slot axis is reduced, the pile becomes more perpendicular in the slot. In the compression or crushing mode, the operating range, that is the distance between the dash lines 38, is smaller than in the case where the weatherstripping is configured to operate in the bending mode as shown in Fig. 2.

Referring to Fig. 3, the weatherstrip 20 is shown installed in an extrusion member 40 having a kerf 42, which is a slot having teeth or grip edges 44 extending along the kerf slot 42. The lock fin 18 engages the grip edges 44 when the pile 20 is received in the kerf 42.

Referring to Fig. 5, there is shown a slot [46] 48 disposed at an acute angle to the surface of the extrusion member [48] 46 from which the pile 20 extends. The pile operates in a bending mode over a large clearance range where the sash surface 50 approaches the surface of the extrusion member 46, which may be a window frame. As shown in Fig. 6, the pile weatherstripping 20 may be used in the corner of a member, such as the corner of a window frame formed by side and bottom extrusion members 52 and 54. The pile 20 is received in a T-slot 56. As the sash 58 approaches the frame [52], the weatherstripping 20 bends at the corner of the sash 58 providing a seal. The weatherstrip may be a continuous weatherstrip which extends around the corner 55. Then the T-slot 56 is internally of the members 52 and 54. A single weatherstrip may then be used to seal the bottom 54 and the sides 52 of the frame.

Figs. 7A, 7B, and 7C illustrates the installation of the weatherstrip 20 by means of a roll in wheel 60 which is journaled in bearings 62. The edge 64 of the wheel may be concave so as to ride on the bead 12. As the extrusion and weatherstrip 20 move together past the wheel 60, and the wheel 60 is brought down into the slot 26, the weatherstrip 20 is bent as shown in Fig. 7B. There the lock fin 18 is still within the neck 30 of the slot 26.

As the wheel 60 is brought down further into the slot, as shown in Fig. 7C, the lock fin 18, due to its resiliency and greater rigidity than the pile 10, springs laterally outward and locks the weatherstrip 20 in the slot 26.

Figs. 8A and 9A show flat weatherstrips 70 and 72, which are similar to the weatherstrip 20 and like parts are identified with like reference numerals. Pile contouring fins 74 and 76 in the form of strips of material which is resilient but more rigid than the pile 10 are assembled into the flat pile. More particularly, the contour fins 74 and 76 are strips which are centered with respect to the pile 10 (midway between the outer edges of the pile 10), and are sandwiched between the pile or the slide fin 22, when that fin 22 is used on the inside of the pile, and the bead 12. These contouring fins are assembled with the pile, lock fin 18 and bead 12 as a unitary assembly, preferably by ultrasonic welding. The material of the contouring fins 74 and 76 may be the same as used for the lock fin 18. Preferably the rigidity of the contouring fins 72 and 74 is between the rigidity of the pile and the rigidity of the lock fin.

The contouring fin [70] 74 is arcuately shaped and retains the arcuate shape when the weatherstrip 70 is inserted in the slot 26 as shown in Fig. 8B. The contouring fin 74 defines the contour or flare of the sides [30] 32 and [32] 34 of the pile 10, which generally follow the contour of the contour fin 74. The installation of an arcuate contouring fin 74 is shown in Fig. 8B.

The installation of the weatherstrip 72 in the T-slot 26 in the member 24 is shown in Fig. 9B. The contouring fin 76, like the fin 74, is of a width less than the width of the flat pile 10 and centered between the outer edges 71 and 73 of the pile. The contouring fin 76, like the fin 74, is of sufficient width to extend out of the slot 26 when the pile is installed in the slot. The contouring fin 76 is wavy in cross section, that is, it has side arms 78 and 80 of convex shape extending from a central section 82 of convex shape. The concave side arms 78 and 80 are spaced further from the edges of the T-slot [60] 26, at the surface of the member, than is the case for the arcuate shaped contouring fin 74, and thus defines a somewhat shallower flare or contour than the contouring fin 74. By selecting the radius of the arc, both of the contouring fin 74 or of the [arm] arms 78 and 80 of the contouring fin 76, the amount of feathering or tapering of the pile parts 32 and 34 and the amount of initial bending of the flat pile, and its desired contour, is obtainable.

From the foregoing description it will be apparent that there has been provided improved

pile weatherstripping, and particularly flat pile weatherstrips, which may operate either in bending or compression modes and assume desired shapes upon installation. Additional shapes of the pile and other variations and modifications thereof, within the scope of the invention, will become more apparent to those skilled in the art. Accordingly the foregoing description and
5 drawings should be taken as illustrative and not in a limiting sense.



APPENDIX B

Marked-up copy of Amended Claims 1, 3, 5, 7, 10 and 19.

1. (amended) A pile weatherstrip which forms a flexible seal projecting from a member when received in a holding slot extending longitudinally along the member, the slot having a throat which defines steps along opposite edges of the throat internally of the slot, said weatherstrip comprising a plurality of strands in side-by-side relationship, which said strands have resiliency to straighten thereby defining a flat pile of strands which extend longitudinally, said flat pile being disposed in said slot bent upwardly along an axis extending longitudinally of said slot and across said strands, and dividing said strands into separate parts tensioned to spring outwardly, portions of said parts being disposed internally of said slot engaging said steps to hold said bent flat pile in said slot, exterior portions of said parts extending outwardly of said slot to define said flexible [pile] seal.

3. (amended) The weatherstrip according to claim 1 wherein said slot and said throat extend along an acute angle inwardly from a surface of said member at which [said] sealing action is provided by said bent [strands] pile which extend from said surface to provide said seal.

5. (amended) The weatherstrip according to claim 1 wherein a flexible rib is disposed along said axis and is [assemble] assembled with said [strand] strands into said flat pile.

7. (amended) The weatherstrip according to claim 1 wherein a fin of flexible material is disposed along the outside of said flat pile, where said pile bends about said axis, provides a locking fin which engages said steps along edges of said fin to retain said bent pile in said slot.

10. (amended) The weatherstrip according to claim 9 wherein a fin of flexible material is disposed along the outside of said flat pile, where said pile bends about said

axis, provides a locking fin which engages said steps along edges of said fin to retain said bent flat pile in said slot, and wherein said internal fin is less rigid than said locking fin.

19. (amended) The weatherstrip according to claim 1 wherein a fin of flexible material, more rigid than said strands and shorter than said [flange] strands but long enough to extend out of said slot when said flat pile is disposed in said slot, said fin being [is] assembled centrally of said flat pile on the inside thereof whereby to define the contour of said parts projecting from said slot.